Ultra High Performance Concrete (UHPC)

Stephen Coley
Structures

Characteristics

Ultra High Performance Concrete is a relatively new concrete product. Compressive strength can range from 18 to 35 KSI with a sustained tensile strength of 0.9 – 1.5 KSI. Currently the product is proprietary and must be mixed on site and is extremely self consolidating.

Concrete for over-pour and formwork

Mix/Pour Method

The mixers used to make UHPC are special shear mixers. A cement mix is combined with water to a certain consistency, and then the steel fibers are added. While forming, an over-pour needs to be included and the pour must be formed over. Every 20' a bucket should be screwed to the forms and a hole cut through the bottom of the bucket and form. The bucket is to be filled partially with concrete to maintain pressure and prevent voids.

Shear mixer and bags of cement mix to be combined with water

Results

The pour was performed in 2 days and used wheelbarrows to move the concrete from the mixer to the pour location. Cylinders were made on site and then brought to Advance Testing for compressive strength tests. After 6 days the average compressive strength of the concrete was 21,173 PSI. The project that this pour was done is located in Waistfield on RT 100.

COMPRESSIVE STRENGTH TEST RESULTS

Specimen Type: 3 x 6 Cylinder **Test Method:** ASTM C780 **Spec PSI:**

Client Cyl #	Lab #	Cure Type	Date Tested	Age Days	Diam A In.	Diam B In.	Area Sq In.	Unit Wt.	Factor	Total Load lbs	Comp. Strength PSI	Comp. Strength MPA	Capping Type	Fracture Type
	19125	Lab	7/26/16	6	3.01	3.00	7.08	158.19	0.98	155550	21610	149.00	G	Cone & Split
	19126	Lab	7/26/16	6	3.02	3.01	7.13	158.13	0.98	153290	21080	145.32	G	Cone & Split
	19127	Lab	7/26/16	6	3.00	3.01	7.10	158.73	0.98	151120	20830	143.59	G	Cone & Split
	19128	Lab	8/17/16	28	3.00	3.00	7.07	0.00	1.00	0	0	0.00		
	19129	Lab	8/17/16	28	3.00	3.00	7.07	0.00	1.00	0	0	0.00		
	19130	Lab	8/17/16	28	3.00	3.00	7.07	0.00	1.00	0	0	0.00		

Remarks: End Capping was completed per C1231 or C617, T231 (N-Neoprene, S-Sulfur, G-Grinding)

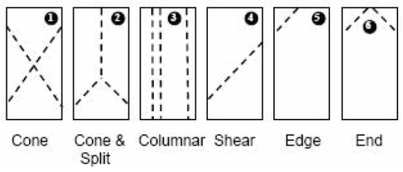
Specimens cast by
Client

Specimens transported by
Client

Reviewed

Latest Strength Tests by:
Parrish, Kevin (01170320)

Tested At
Campbell Hall, NY



Results from compressive tests

Conclusion

The goal of this product was to get a more durable joint and hopefully save some time. Installation of the concrete was overall a success. Strength of final product met the anticipated results. Final costs were higher than anticipated, if a nonproprietary product becomes available it could broaden its use and make it a more cost efficient product.

Acknowledgments

Principal champion on this project Ben Graybeal, Lead design group McFarland Johnson, Project manager Rob Young.

References

http://vtrans.Vermont.gov/planning/research/2017symposium